SMITHSONIAN ASTROPHYSICAL OBSERVATORY

CONTRACT NAS5-21748

Type I Progress Report September 1 - October 31, 1972

Discipline and Sub-Discipline: 3. Mineral Resources Geological Structure and Landform Surveys

J. Lithologic Surveys

K. Structural Surveys

a. Mapping of the Major Structures of the African Rift System
Proposal number 320

b. Dr. Paul Mohr OT-306

c. None at present. Dr. Mohr has begun receiving imagery of the area he is investigating (see previous report).

d. Dr. Mohr has received roughly 100 ERTS-1 images of the African rift system and environs, with cloud-cover of 20% or less. Major structural lineaments have been sought and marked on all received images of sufficient quality. (Note: Even 20% cloud-cover can ruin imagery where, as in the rift system, structure is topographically expressed and thus 'attracts' clouds.) Thus far, all structural mapping has been done from the 24 x 24 cm. prints. The use of transparencies will be deferred until coverage of the rift system is complete, and a unified structural map of the whole region can be drawn up.

Section e. Significant Results

ERTS imagery of the African rift system resolves the major Cainozoic faults, zones of warping and the associated volcanism. It also clearly depicts the crustal 'grain' of the PreCambrian rocks where these are exposed.

New structual features, or new properties of known features such as greater extent, continuity, linearity, etc., are revealed by the ERTS imagery. This applies, for example, to the NE-SW fracture zones in Yemen, the Aswa mylonite zone at the northern end of the Western Rift, the Nandi fault of western Kenya, the arcuate faults of the Elgeyo escarpment in the Gregory Rift, and the hemi-basins of warped Tertiary lavas on the Red Sea margin of Yemen, matching those of the Ethiopian plateau-Afar margin.

A tentative scheme is proposed, relating the effect on the pattern of Cainozoic faulting of the degree of obliquity to PreCambrian structural trend. It is particularly noteworthy that, even where the PreCambrian 'grain' determines the rift faulting to be markedly oblique to the overall trend of the rift trough, for example in central Lake Tanganyika, the width of the trough is not significantly increased.

Some ground-mapped lithological boundaries are obscure on ERTS imagery. This is partly due to the limitations of satellite imagery, but it also seems that present approaches to mapping of PreCambrian terrain in Africa may require radical revision with the input of satellite imagery.

f. None

g. None at present

h. N. A.

i. N. A.

j. N. A.

k. The funds remaining in the contract are adequate for the period of the contract. Dr. Mohr is presently preparing a Smithsonian Astrophysical Observatory Special Report on the findings indicated in section e. above.